

Reduced Order Aeroservoelastic Models with Rigid Body Modes, Phase I

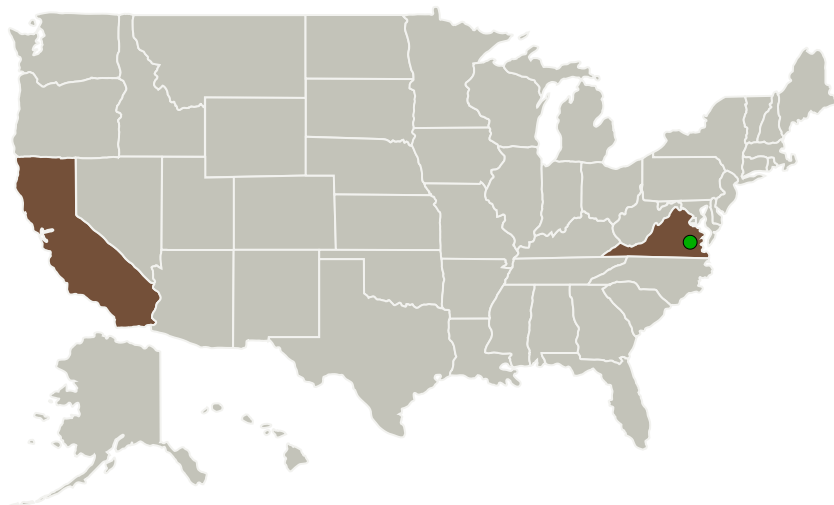
Completed Technology Project (2012 - 2012)



Project Introduction

Complex aeroelastic and aeroservoelastic phenomena can be modeled on complete aircraft configurations, generating models with millions of degrees of freedom. Reduced order models are used for systems and control analysis. The ability to do so on freely supported vehicles has been demonstrated including estimates of the rigid body dynamics. Improvements to this process are proposed to more closely match known frequency responses in the rigid body range, and to generate the reduced order models in a form that can be used for linear parameter varying control design methods. A set of modest order aircraft models will be collected and created using flexible structures and doublet lattice aerodynamics. These models will be used develop and demonstrated the improved model order reduction methodology, and then a plan will be developed to generalize this process for very high fidelity models. The improvements will increase the technical readiness of new model order reduction methods used to create aeroelastic models that include rigid body dynamics. The ability to create these models in the form used by linear parameter varying control methods will make it possible to develop flight control systems with provable robustness across the entire flight envelope.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Systems Technology, Inc	Lead Organization	Industry	
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

**February 2012:** Project Start**August 2012:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140255>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Systems Technology, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Peter M Thompson

Co-Investigator:

Peter M Thompson

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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System